June 13, 1939. R. L. BREADNER ET AL 2,162,546

GASEOUS ELECTRIC DISCHARGE DEVICE

Filed Feb. 20, 1936

Fig. 1

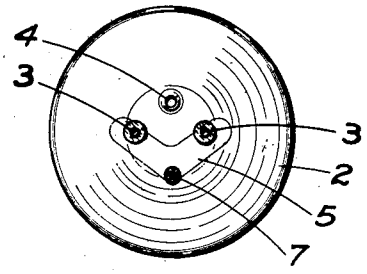


Fig. 2

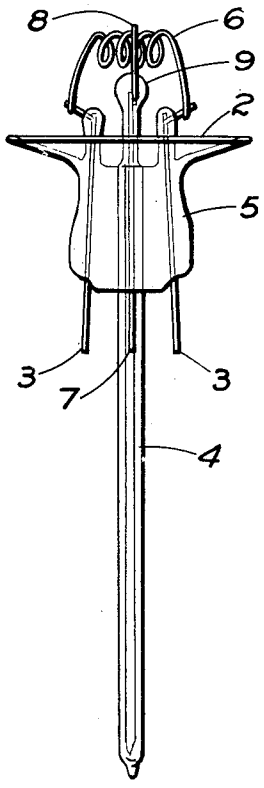


Fig. 3

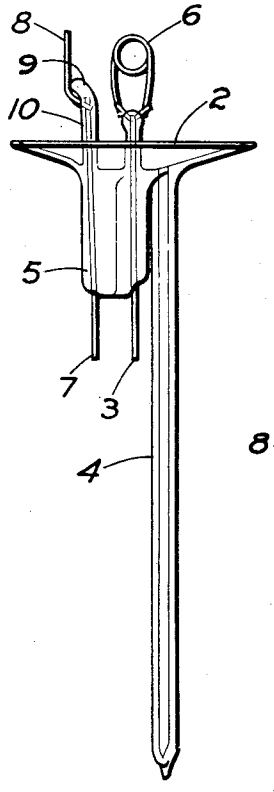
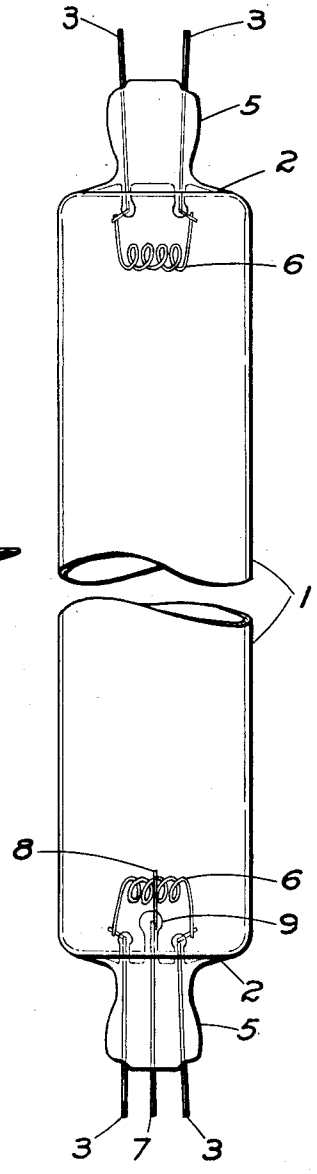


Fig. 4



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GASEOUS ELECTRIC DISCHARGE DEVICE

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4 Claims. (Cl. 176—126)

The present invention relates to gaseous electric discharge devices generally and more particularly the invention relates to such devices intended to operate with elevated container temperatures and the gaseous atmosphere of which consists of or comprises a metal vapor.

It is desirable in such devices to have all parts of the container heated by the discharge to a temperature such that the metal vapor is at an effective pressure during the operation of the device. When elongated, tubular containers are used it is desirable to mount the electrodes in close proximity to the ends of the container so that said ends, as well as the part of the container between the electrodes, are heated to the desired temperature. It is also desirable to fuse the exhaust tube to the end of the container.

The object of the present invention is to provide a stem structure for gaseous electric discharge devices of the above type which is capable of fabrication on automatic machinery. Another object of the invention is to provide a stem structure comprising an auxiliary electrode in operative relation to a disintegratable main electrode and means for preventing the formation of an electrical connection between said electrodes by the disintegrated electrode material. Still further objects and advantages attaching to the device and to its use and operation will be apparent to those skilled in the art from the following particular description.

In accordance with these objects the stem comprises a flared part which is adapted to be fused to the tubular part of the lamp container, a V-shaped pinch contiguous to said flared part, an exhaust tube fused to said flared part and a shield interposed between the main electrode and the lead of the auxiliary electrode. The elimination of the usual tube between the flared part of the stem and the pinch part thereof makes possible the mounting of the electrode in close proximity to the end of the container. The V-shaped pinch makes possible the fusing of the exhaust tube to the flared part of the stem even when the flare is of small diameter. The shield interposed between the main electrode and the current lead of the auxiliary electrode prevents deposits of electrically conducting, sputtered material from the main electrode and thus prevents the sputtered material from forming an electrical connection between the main electrode and the auxiliary electrode.

In the drawing accompanying and forming part of this specification an embodiment of the invention is shown, in which

Fig. 1 is a top view of a stem structure embodying the invention,

Fig. 2 is a front elevational view of the stem illustrated in Fig. 1,

Fig. 3 is a side elevational view of the stem illustrated in Fig. 2, and

Fig. 4 is a front elevational view of the gaseous electric discharge device having stems similar to that illustrated in Figs. 1, 2 and 3.

Like numbers denote like parts in all the figures.

Referring to the drawing the stem structure comprises a flare 2, a V-shaped pinch part 5 contiguous with said flare, an exhaust tube 4 fused to said flare 2 in a line bi-secting the angle of the V-shaped pinch 5. The main electrode 6 is mounted on a pair of current leads 3 fused into said pinch 5 adjacent the ends of said pinch 5 and the auxiliary, starting electrode 8 is mounted on a current lead 7 fused in the V-shaped pinch 5 at the part thereof where the two legs join.

In the manufacture of the stem described above the current leads 3 and 7, which are preferably made of tungsten, are surrounded by glass which covers the joint between said leads 3 and the supports for the electrode 6 and the welded joint between the auxiliary electrode 8 and the lead 7. The leads 3 and 7 are then inserted in a tubular glass member attached to the flare 2, the tubular member is then heated to the softening temperature thereof and the V-shaped pinch 5 is then formed. This operation is done on automatic machinery. The exhaust tube 4, which is closed at both ends, is then brought into position against the flare 2 between the legs of the V-shaped pinch 5. The surface on the opposite side of the flare 2 is then heated at a point opposite the tube 4, the flare softens and the end of the tube 4 abutting on the flare 2 is thus fused to the flare. The air in the tube 4 is expanded by the heat and blows a hole in the flare.

The electrode 6 which consists of a metal filament, such as a tungsten filament, having an electron emitting material, such as barium oxide, associated therewith is then mounted on the supports welded to the current leads 3 and the stem is fused into the container 1. The usual steps in the manufacture of this type of device, such as high frequency treatment of the electrodes 6, exhaust and so forth are then carried out. When the manufacture of the device is otherwise complete the exhaust tube 4 is sealed off closely adjacent the flare 2. During the fus-

ing of the stem to the tube 1 it is frequently desirable to interpose a shield between the pinch 5 and the flame to avoid strains in the pinch from too rapid heating thereof.

The V-shape of the pinch and the attaching of the exhaust tube 4 to the flare 2 between the legs of the pinch makes possible a diminution of the diameter of the flare 2 while retaining sufficient distance between the fusion point of the tube 4 and the flare 2 and the rim of the flare and the pinch 5 to avoid complications in the fusing of the tube 4 to the flare and the fusing of the flare 2 to the tube 1. The lamp can thus be made of smaller diameter than has been practical heretofore when a straight pinch and an exhaust tube has been fused to the end thereof.

The end 9 of the glass coating covering the joint between the auxiliary electrode 8 and the lead 7 therefor is of greater outside diameter than the auxiliary electrode 8, extends a short distance along the auxiliary electrode 8 and is interposed between said electrode 8 and the main electrode 6, as shown in Figs. 2 and 3. The end 9 thus acts as a shield to prevent the sputtered electrode particles from the main electrode 6 depositing on the side of the end 9 of the glass coating whereat the electrode 8 emerges. An electrically conducting connection of sputtered electrode material between the auxiliary electrode 8 and the main electrode 6 is thus avoided.

While we have shown and described and have pointed out in the annexed claims certain novel features of the invention, it will be understood that various omissions, substitutions and changes in the forms and details of the device illustrated and in its use and operation may be made by those skilled in the art without departing from the broad spirit and scope of the invention, for example, the lead for the auxiliary electrode 6 may pass through the pinch 5 elsewhere than at the apex of the V and the lead passing through the apex of the V may lead to an electrode other than an auxiliary electrode for starting. The enlarged end 9 of the glass sheath may be used to protect the lead to the auxiliary electrode even when that lead does not pass through the apex of the V.

What we claim as new and desire to secure by Letters Patent of the United States, is:

1. A stem for an electric discharge device, said stem comprising a flare, a pinch contiguous with said flare, current leads sealed into said pinch, and an exhaust tube fused to said flare, said pinch being V-shape in a section transverse to the axis of said stem, said exhaust tube being fused to said flare of said flare opposite the concave side of the pinch.

2. A stem for a gaseous electric discharge device, said stem comprising a flare, a pinch part contiguous with said flare, current leads fused into said pinch and extending beyond said flare, an auxiliary electrode mounted on one of said leads, a main electrode mounted on other leads and a shield interposed between said main electrode and the point at which said auxiliary electrode emerges from said flare.

3. A gaseous electric discharge device comprising a container, electrodes and electrode leads sealed therein, a gaseous atmosphere therein, and an external pinch on said container, said pinch being contiguous with said container and being V-shape in a section transverse to the longitudinal axis of said container.

4. The method of manufacturing a gaseous electric discharge device which comprises the steps of sealing current leads through a V-shaped pinch contiguous to a flare, fusing an exhaust tube to said flare at a part of said flare opposite the concave side of the pinch, mounting an electrode on said leads and fusing said flare to the container of the device.

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